Original Article

Outcomes in Patients with Mild Traumatic Brain Injury with No Significant Radiological Findings

Sanobar Pitafi, Farhad Ali Bhutto, Talha Bhatti, Shuja Shaukat, Umair Sharif, Atiq Ahmad Khan, Waseem Asif

ABSTRACT:

Objective: To determine the functional outcomes in patients presenting with mild traumatic brain injury (mTBI) without significant radiological findings and to assess symptom improvement at follow-up.

Methodology: A prospective observational study was conducted in the Emergency and Neurosurgery Department of Shaheed Mohtarma Benazir Bhutto Trauma Center (SMBBIT), Karachi, Pakistan, from June to November 2025. A total of 264 patients aged 18–50 years with mTBI, no significant CT findings, and presentation within 24 hours of injury were enrolled using non-probability sampling. Demographic and clinical data, including mechanism of injury, comorbidities, medications, and work absence, were recorded. Functional outcomes were assessed using the Extended Glasgow Outcome Scale (eGOS). Follow-up at 2 and 6 weeks was stratified by initial eGOS score. Chi-square and Fisher's exact tests were applied, p value less than 0.05 was marked as significant.

Results: The mean age of patients was 37 years, and males accounted for 82.2% of cases. The median eGOS score was 7, and 70.8% of patients had mild disability. At 2-week follow-up, headache (97%), absence from work (73%), and vomiting (39%) were common symptoms. At 6 weeks, 72% of patients reported difficulty concentrating.

Conclusion: Functional outcomes in mTBI patients were generally favorable; however, persistent symptoms, including headache, vomiting, and concentration difficulties, persisted during follow-up.

KEYWORDS: Extended Glasgow Outcome Scale (eGOS), Functional outcomes, Mild Traumatic Brain Injury (mTBI),

INTRODUCTION

Globally, traumatic brain injury (TBI) is one of the main causes of trauma-related mortality.[1] Neuromonitoring is scarce in low- and middle-income nations. The most predominant group, mild traumatic brain injury (mTBI), has a wide range of presentations, from patients with a Glasgow Coma Scale (GCS) score of 15 and no acute intracranial traumatic injury found on a brain computed tomography (CT) scan to those with a GCS score of 13 and significant brain damage on a CT scan. Following mTBI, even patients with normal CT head scans may have ongoing symptoms for months or years.[2] The therapeutic demand for biomarkers to forecast recovery or the emergence of long-term consequences from mTBI is unfulfilled.[3] Many patients have long-term consequences that negatively impact their quality of life and capacity to work. As of now, there is no reliable method for identifying patients who may benefit from early assessment and focused care.

Sanobar Pitafi,[1]
Postgraduate Resident
Farhad Ali Bhutto,[2]
Assistant Professor
Talha Bhatti,[3]
Consultant
Shuja Shaukat,[4]
Registrar
Umair Sharif,[5]
Postgraduate Resident
Atiq Ahmed Khan,[6]
Professor
Waseem Asif,[7]
Medical Manager
[1-2,5-6]Civil Hospital/Shaheed Mohtarma Benazir Institute of Trauma, KHI, PAK.
[3-4]Dow University of Health Sciences, KHI, PAK.
[7]Univeristy of Sindh, Jamshoro, PAK.

Correspondence
Wasseem Asif
drwaseem.asif@hotmail.com

Patients are frequently told that their symptoms will go away in a few days since mTBI is thought to be a benign, self-limiting injury. This "mild" classification, however, masks considerable complexity. Moreover, there are numerous causes of persistent symptoms following an mTBI that are not always related to physical brain injury. Patients are surviving greater injuries and becoming increasingly dependent on their families, hospitals, and long-term care facilities as a result of advancements in supportive care.[4] Withdrawal of treatment is responsible for up to 70% of early fatalities from traumatic brain injuries.[5] Many of these individuals, meanwhile, had a reasonable chance of recovery. For early decision-making, a trustworthy prognostic indicator would be helpful. The most commonly used outcome measure in TBI clinical studies is the Extended Glasgow Outcome Scale (eGOS).[6] Depending on the goal of the study, there are various ways to administer the eGOS.

In Pakistan, there are over 300,000 new cases of TBI every year, with road traffic accidents, falls, and violence being the main causes.[7] Particularly in primary care settings in this region, there is a scarcity of research related to post-mTBI outcomes. Although cognitive and neuro-behavioral sequelae are generally self-limiting and reasonably predictable, a subset of patients continues to experience persistent symptoms. The Extended Glasgow Outcome Scale (eGOS) has been used globally to quantify functional outcomes and may estimate the persistence of lasting symptoms. The rationale for this research was to assess persistent symptoms and identify symptom improvement using eGOS. Hence, the objective of the study was to determine the functional outcomes in patients presenting with mTBI with no significant radiological findings. We also determined the frequency of mTBI and the rate of symptom improvement at follow-up.

METHODOLOGY

A prospective, observational study was conducted in the Emergency and Neurosurgery Department of Shaheed Mohtarma Benazir Bhutto Trauma Center (SMBBIT), Karachi, Pakistan, from June 2025 to November 2025, after obtaining approval from the Ethical Review Board (IRB-000174/SMBBIT /Approval/2025). The sample size was calculated using the OpenEpi sample size calculator, which yielded 264, with an estimated prevalence of mTBI of 78%, a confidence level of 95%, and a margin of error of 5%.[8] The non-probability convenience sampling technique was utilized. Patients aged 18–50 years presenting to the emergency department of SMBBIT within 24 hours of injury with mild traumatic brain injury (mTBI) and no significant CT scan findings were included. Patients were excluded if they had positive radiological findings; a Glasgow Coma Scale (GCS) score <13 at presentation or a decline to <13 during hospitalization; did not provide informed consent; were intoxicated at the time of injury; had a history of psychiatric illness; had severe non-neurosurgical or life-threatening systemic injuries; were pregnant; had non-salvageable brain injuries; had a language barrier; or were lost to follow-up.

All patients presenting to SMBBIT who fulfilled the inclusion criteria were enrolled in the study through a complete history and physical examination done by emergency doctors and neurosurgery residents on duty. CT scans were performed by designated technicians working in the setup. Neurosurgery residents assessed imaging findings while on call, with a radiology consultant available for supervision. Patients with a Glasgow Coma Scale (GCS) score of 13–15 and no abnormalities on CT scan were observed and subsequently discharged. They were then followed up at 2 and 6 weeks to assess functional outcomes and the progression of symptom improvement. This is a standard follow-up protocol in our setup, so there was no extra financial burden on the patient or family. All data were entered into a structured, self-designed proforma completed by the principal investigator. Demographic data, including age, gender, and employment status, were recorded, along with clinical data such as mechanism of

injury, time of presentation, comorbidities, current medications, and time away from work due to mTBI. Mild TBI is defined by a GCS score of 14 or 15 at presentation and one or more of the following symptoms: <5 min loss of consciousness, impaired alertness, or memory. The functional outcome is assessed using eGOS. The eGOS is designed to determine disability severity on a scale of 1–8, categorized into death, unfavorable, and favorable outcomes. An unfavorable score of 2–6 denotes a moderate to severe disability. A favorable score of 7–8 indicates mild disability or even complete recovery to the pre-injury state, such as the ability to work without assistance and to resume participation in social activities.

Data was entered and analyzed in IBM SPSS version 27. Continuous variables were reported as medians and interquartile ranges (IQRs) due to data skewness. The categorical variables were reported as frequencies and percentages. Stratification of baseline and clinical data with eGOS was done. Similarly, the follow-up data from 2 and 6 weeks were also stratified with the initial eGOS. Chi-square and Fisher's exact tests were applied to assess the association between functional outcomes (measured using eGOS) and baseline and clinical factors, as well as follow-up results. A p-value of ≤0.05 was considered significant.

RESULTS

Among the 264 patients included, the mean age was 37 years. Male patients were predominantly affected (n: 217, 82.2%). More than half of the patients were employed full-time (147, 55.7%), followed by part-time employment (67, 25.4%). Patients suffered from mTBI mainly due to road traffic accidents (RTA) (148, 56.1%) and assault (71, 26.9%). Most patients presented between 30 minutes and 24 hours after the incident (167, 63.3%). Diabetes was present in 71 patients (26.9%). Of 264 patients, 193 were using analgesics at the time of assessment. The median number of workdays lost was 3 (IQR: 1–9). We observed a median eGOS score of 7, with 187 (70.8%) patients classified as having a favorable eGOS (Table I).

Table I: Baseline characteristics of the patients

Characteristics	Median / Frequency	Interquartile range / Percentage
Age (years)	37	37 – 43
Gender	**Frequency**	**Percentage**
Male	217	82.2%
Female	47	17.8%
Employment status		
Unemployed	44	16.7%
Student	6	2.4%
Part-time	67	25.4%
Full-time	147	55.7%
Mechanism of injury		
Road traffic accident	148	56.1%
Fall	45	17%
Assault	71	26.9%
Presentation time		
<30 minutes	97	36.7%
30 minutes – 24 hours	167	63.3%
Comorbidities		
Diabetes	71	26.9%
None	193	73.1%
Current medication (analgesics)		
Yes	193	73.1%
No	71	26.9%
Number of workdays lost	3	1 – 9
eGOS value	7	6 – 8
eGOS functional outcome		
Favourable	187	70.8%
Unfavourable	77	29.2%

Table II summarizes the details of the relationship between baseline and clinical factors and the functional outcome (eGOS). Age ($p < 0.001$), gender ($p < 0.001$), employment status ($p < 0.001$), mechanism of injury ($p < 0.001$), presentation time

(p = 0.003), and comorbidities (p = 0.002) were found to be statistically significant. Generally, patients aged 31 to 40 years had favorable eGOS scores. Male patients had better outcomes than female patients (89.3% vs. 10.7%).

Table II: Relation of baseline and clinical factors with the functional outcome (eGOS)

Categories	eGOS		p-value
Age	**Unfavorable scores (N:77)**	**Favorable scores (N:187)**	
11-20	0	1 (0.5%)	<0.001*
21-30	10 (13%)	3 (1.6%)	
31-40	48 (62.3%)	107 (57.2%)	
41-50	19 (24.7%)	76 (40.6%)	
Gender			
Male	50 (64.9%)	167 (89.3%)	<0.001
Female	27 (35.1%)	20 (10.7%)	
Employment status			
Unemployed	26 (33.8%)	18 (9.6%)	<0.001*
Student	3 (3.9%)	3 (1.6%)	
Part-time	11 (14.3%)	56 (29.9%)	
Full-time	37 (48.1%)	110 (58.8%)	
Mechanism of injury			
Road traffic accident	37 (48.1%)	111 (59.4%)	<0.001
Fall	27 (35.1%)	18 (9.6%)	
Assault	13 (16.9%)	58 (31%)	
Presentation time			
<30 minutes	39 (50.6%)	58 (31%)	0.003
30 minutes -24 hours	38 (49.4%)	129 (69%)	
Comorbidities			
Diabetes	13 (16.9%)	58 (31%)	0.022
None	64 (83.1%)	129 (69%)	
***Fisher's Exact test applied**			

Significant at 5% level of significance

Similarly, full-time (58.8%) and part-time (29.9%) employed patients showed more favorable outcomes. Moreover, patients who were employed full-time (48.1%) and unemployed (33.8%) had unfavorable outcomes.

Patients who suffered from mTBI due to RTA (59.4%) and assault (31%) had comparatively better eGOS. Additionally, patients who presented within 24 hours had favorable outcomes (69%).

Figure 1 displays the symptoms experienced by patients at the 2-week follow-up. A total of 193 patients took time off work; 103 had episodes of vomiting, and 258 reported headaches.

Figure I: Symptoms after 2 weeks of follow-up

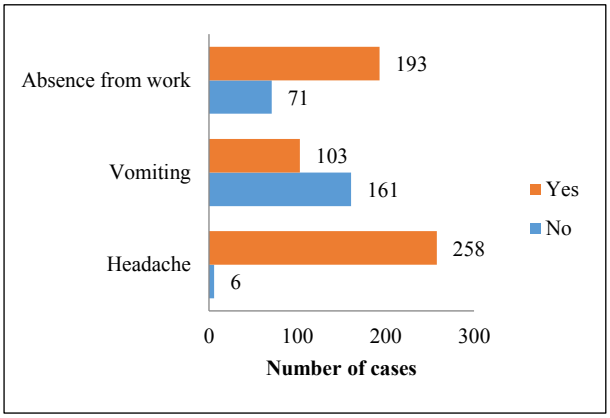
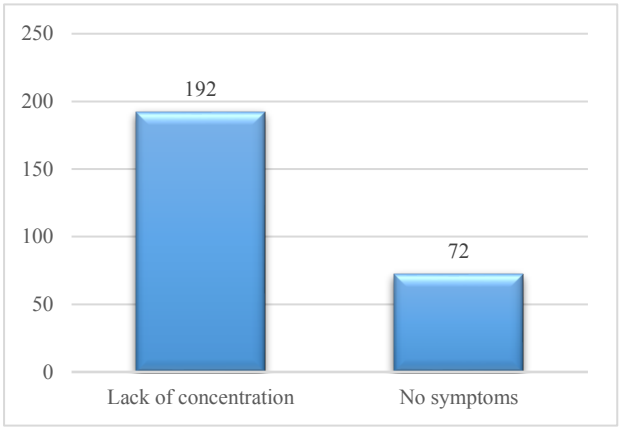


Figure II: Symptoms after 6 weeks of follow-up



After 6 weeks of follow-up, 192 patients still had difficulty concentrating, while 72 had no complaints (Figure 2). Table III includes stratification of symptom improvement at 2 and 6 weeks of follow-up by initial eGOS.

Table III: Stratification of improvement of symptoms at 2- and 6-week follow-up with initial eGOS			
Follow-up results	**Initial eGOS**		**p-value**
2 weeks follow-up	**Unfavorable scores (N:77)**	**Favorable scores (N:187)**	
Headache			
Yes	73 (94.8%)	2 (1.1%)	0.062*
No	4 (5.2%)	185 (98.9%)	
Vomiting			
Yes	37 (48.1%)	66 (35.3%)	0.071
No	40 (51.9%)	121 (64.7%)	
Absence from work			
Yes	64 (83.1%)	129 (69%)	0.022
No	13 (16.9%)	58 (31%)	
6 weeks of follow-up			
Lack of concentration	64 (83.1%)	128 (68.4%)	0.022
No symptoms	13 (16.9%)	59 (31.6%)	
***Fisher's Exact test applied**			

Significant at 5% level of significance

Among patients who took time off work after 2 weeks of follow-up, 64 patients initially had unfavorable eGOS scores, while 129 had favorable eGOS scores (p = 0.022). After 6 weeks of follow-up, 64 patients who initially experienced concentration difficulties had unfavorable eGOS, while 128 patients had favorable eGOS (p = 0.022).

DISCUSSION

Since the majority of patients with TBI are young and economically productive, this condition poses a significant public health cost.[9] Unfortunately, TBI is a spectrum of disease entities, making it difficult to define "best practice" and forecast results.[10] The current study determined functional outcomes using eGOS in patients presenting with mTBI and the improvement in symptoms at follow-up. We found that the average eGOS score was 7, with 70.8% of patients classified as having a favorable eGOS, indicating mild disability. After two weeks of follow-up, 129 patients with mild disability and 64 patients with moderate disability took time off work. Following a six-week follow-up, 128 patients were mildly disabled, 64 patients were moderately disabled, and had trouble focusing.

A prospective study reported a median eGOS score of 7, which is consistent with our results.[11] In a study from Norway, 92 mTBI patients had persistent post-concussion symptoms after 3 to 18 months, due to which 43% were absent from work.[11] Similarly, a study from the Netherlands detected neurological issues, including post-concussion syndrome, in 6.3% of mTBI patients after 6 months.[12] In our study, 192 patients (72.73%) reported difficulty concentrating at 6 weeks of follow-up. In comparison, a prospective study estimated that almost 35% of mTBI patients had concentration problems at 3 months of follow-up.[13] Evidence from Iran suggested that age, GCS score, pupillary light reflex, and ICU length of stay were predictors of TBI outcomes among TBI survivors, using eGOS cut-off values.[14] Study conducted in Norway deduced that in TBI patients with a GCS score of less than 13, two-thirds showed good recovery, while one-third had poorer outcomes.[15] Significantly, there was a lot of change, mostly improvement, in the eGOS score between 6 and 12 months, which calls into question the use of the 6-month outcome as an arbitrary endpoint in research.[15] Research from Sweden attained results showing women suffering from greater disability as compared to men.[16] Contrasting results were seen in the current study, with males suffering more. Studies from Karachi, Paris, and India also found that males were more commonly affected.[17-19]

Baseline patient features and sociodemographic variables may also influence recovery following mTBI. Factors including age, sex, education level, marital status, housing environment, and employment or retirement status may affect the course of rehabilitation and the likelihood of persistent symptoms. For example, poorer cognitive results following brain injury have been linked to lower educational achievement, which may indicate reduced cognitive reserve. Numerous studies included various prognostic indicators, such

as trajectory-based stratification, two eGOS scoring methods, and the Full Outline of Unresponsiveness (FOUR) score.[6,20,21] To improve outcome prediction in mTBI, future prognostic modeling may benefit from incorporating biomechanical measurements, genetic susceptibility markers, and neuroinflammatory signals, in addition to current clinical guidelines.[22] Attempts to go beyond conventional clinical features and to incorporate advanced analytics, machine learning, and electronic medical records could help with precise diagnosis.[22] These frameworks might combine clinical phenotypes, neuroimaging, and biomarkers to improve clinical management, resource allocation, and referral tactics.[23] However, gathering data from "notional" electronic health records presents difficulties, which raises questions about the necessity of continuously updating models when depending on previous assumptions.[22]

The study's strength was that we followed patients at two time points, which was arduous but enabled thorough tracking of symptom improvement. However, limitations were also present. Due to the observational study design, selection bias was imminent. In addition, we cannot generalize the results because of single-center research. Randomized trials should be the primary focus of future research to understand better how resource availability affects TBI outcomes. Furthermore, the six-week follow-up period may have been insufficient to detect meaningful variations in results that might have emerged over a longer period. Recovering from a TBI can be a lengthy procedure, and significant variations in the outcome could appear months or years after the initial accident.

CONCLUSION

Patients with mTBI generally had favorable functional outcomes; however, symptoms such as headache and vomiting persisted at two weeks, and concentration difficulties remained at six weeks. A substantial proportion were unable to return to work, adversely affecting their quality of life. Further multicenter studies are needed to address gaps in post-discharge follow-up care and to improve the generalizability of the findings.

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REFERENCES

1. Guduru KD, Teferi MG, Teklehaimanot HK, Woldemariam MA, Baleh A, Mendere SM. Determinants of outcomes following decompressive craniectomy for traumatic brain injury: a multicenter prospective cohort study in Addis Ababa, Ethiopia. Interdisciplinary Neurosurgery. 2026;(43): 102167. doi: 10.1016/j.inat.2025. 102167.
2. Richter S, Winzeck S, Correia MM, Czeiter E, Whitehouse D, Kornaropoulos EN, et al. Predicting recovery in patients with mild traumatic brain injury and a normal CT using serum biomarkers and diffusion tensor imaging (CENTER-TBI): an observational cohort study. EClinicalMedicine. 2024;(75): 102751. doi: 10.1016/j.eclinm.2024.102751.
3. Sassani M, Ghafari T, Arachchige PRW, Idrees I, Gao Y, Waitt A, et al. Current and prospective roles of magnetic resonance imaging in mild traumatic brain injury. Brain Commun. 2025;7(2):fcaf120. doi: 10.1093/ braincomms/ fcaf120.
4. Shanahan R, Avsar P, Watson C, Moore Z, Patton D, McEvoy NL, et al. The impact of brain tissue oxygenation monitoring on the Glasgow Outcome Scale/Glasgow Outcome Scale Extended in patients with moderate to severe traumatic brain injury: A systematic review. Nurs Crit Care. 2024;29(6):1460-1469. doi: 10.1111/nicc.12973.
5. Wong AM, McGillen P, Ichiuji BA, Ambrose CI, Forman SD, Martin MJ. Predicting functional outcomes in adult traumatic brain injuries using the base deficit, international normalized ratio, and Glasgow Coma Scale score. J Surg Res. 2025;(314):31-37. doi: 10.1016/j.jss.2025.06.089.
6. Temkin N, Barber J, Machamer J, Boase K, Hwang P, Bodien YG, et al. Effect of two Glasgow Outcome Scale-Extended scoring methods on traumatic brain injury clinical trial design: A TRACK-TBI study. J Neurotrauma. 2025;0(0): 89771512 51405 878. doi:10.1177/08977151251405878.
7. Magnusson BM, Ahrenby E, Stalnacke BM. Symptoms and disability after mild traumatic brain injury: a five-year follow-up. J Integr Neurosci. 2024;23(2):45. doi: 10.31083/j.j in2302045.
8. Mahmoud FH, Mansour DAH, Roshdy AI, Srour OAWAJTEJoHM. Comparative study between Glasgow Coma Scale and Full Outline of Unresponsiveness scale in clinical outcomes prediction of neurological disorders patients. 2022;89(1):5248-5257. doi: 10.21608/ejhm.2022.262 204.
9. Chawnchhim AL, Mahajan C, Kapoor I, Sinha TP, Prabhakar H, Chaturvedi A. Comparison of Glasgow Coma Scale Full Outline of UnResponsiveness and Glasgow Coma Scale: Pupils score for predicting outcome in patients with traumatic brain injury. Indian J Crit Care Med. 2024;28(3):256–264. doi:10.5005/jp-journals-10071-24651.

10. Fitzgerald M, Tan T, Rosenfeld JV, Noonan M, Tee J, Ng E, et al. An initial Glasgow Coma Scale score of 8 or less does not define severe brain injury. Emerg Med Australas. 2022;34(3):459-461. doi: 10.1111/1742-6723.13937.
11. Sandboe MI, Fordal L, Olsen A, Iverson GL, Skirbekk H, Moller Thastum M, et al. Comparing people with persisting post-concussion symptoms from an emergency department-based research sample with patients in a clinical rehabilitation sample: an explorative, retrospective analysis. J Rehabil Med. 2026;58:jrm45004. doi: 10.2340/jrm.v58.45004.
12. Voormolen DC, Cnossen MC, Polinder S, von Steinbuechel N, Vos PE, Haagsma JA. Divergent classification methods of post-concussion syndrome after mild traumatic brain injury: prevalence rates, risk factors, and functional outcome. J Neurotrauma. 2018;35(11):1233–1241. doi:10.1089/neu.2017.5257.
13. Coffeng SM, Jacobs B, Kim LJ, Ter Maaten JC, van der Naalt J. Incomplete recovery in patients with minor head injury directly discharged home from the emergency department: a prospective cohort follow-up study. BMJ Open. 2022;12(6):e 057308. doi: 10.1136/bmjopen-2021-057308.
14. Ansari A, Zoghi S, Feili M, Azad TD, Mousavi SR, Niakan A, et al. The impact of Glasgow Outcome Scale–Extended cut-point of dichotomization on factors associated with outcomes in traumatic brain injury research. Neurosurg Rev. 2025;48(1): 767. doi:10.1007/s10143-025-03918-y.
15. Pantelatos RI, Stenberg J, Follestad T, Sandrod O, Einarsen CE, Vik A, et al. Improvement in functional outcome from 6 to 12 months after moderate and severe traumatic brain injury is frequent, but may not be detected with the Glasgow Outcome Scale–Extended. Neurotrauma Rep. 2024;5(1):139–149. doi:10.1089/neur.2023.0109.
16. Wagberg S, Stalnacke BM, Magnusson BM. Gender and age differences in outcomes after mild traumatic brain injury. J Clin Med. 2023;12(15):4883. doi: 10.3390/jcm12154883.
17. Zaidi S, Rahman AS, Zafar A, Yasir H, Akhter SJ. Clinical management and outcomes of traumatic brain injury: a comparative study of high-resource and low-resource hospital settings. Pak J Neurol Surg. 2025;29(1):53–61. doi:10.36552/pjns.v29i1.1066.
18. Alnaami I, Alshehri S, Alghamdi S, Ogran M, Qasem A, Medawi A, et al. Patterns, types, and outcomes of head injury in Aseer Region, Kingdom of Saudi Arabia. Neurosci J. 2019;2019(1):2782146. doi: 10.1155/2019/2782146.
19. Pate RS, Hire RC, Rojekar MV. Pattern of head injury in central India population. Int J Res Med Sci. 2017;5(2):3515–3519. doi:10.18203/2320-6012.ijrms20173553.
20. Curpen PP, To XV, Lu M, Winter C, Bellapart J, Newcombe VF, et al. Trajectories of Glasgow Outcome Scale-Extended after traumatic brain injury: an analysis of the TRACK-TBI cohort. J Neurol Neurosurg Psychiatry. 2026;97(3):239-45. doi: 10.1136/jnnp-2025-336835.
21. Jain H, Nair JN, Shashank DV, Krishnaswamy V, Ganesh K. Comparing the Full Outline of Unresponsiveness (FOUR) score and the Glasgow Coma Scale (GCS) for predicting outcomes in traumatic brain injury: a comparative study. Journal of trauma and injury. 2025;38(4):327-34. doi: 10.20408/jti.2025.0125.
22. Cruz Navarro J, Ponce Mejia LL, Robertson C. A precision medicine agenda in traumatic brain injury. Front Pharmacol. 2022;13:713100. doi:10.3389/fphar.2022.713100.
23. Gupta M, Khan S, Bunk S, Patil A, Stilling J, Singh J, et al. Management and prognosis of patients with mild traumatic brain injury: a narrative review. Brain Sci. 2026;16(3):273. doi: 10.3390/brainsci16030273.

Author Contributions:

Sanobar Pitafi: Conceived the study designed, carried out the data collection and statistical analysis and drafted the manuscripts

Farhad Ali Bhutto: Conceived the study designed, carried out the data collection and statistical analysis and drafted the manuscripts

Talha Bhatti: Conceived the study designed, carried out the data collection and statistical analysis and drafted the manuscripts

Shuja Shaukat Conceived the study designed, carried out the data collection and statistical analysis and drafted the manuscripts

Umair Sharif: Conceived the study designed, carried out the data collection and statistical analysis and drafted the manuscripts

Atiq Ahmad Khan: Conceived the study designed, carried out the data collection and statistical analysis and drafted the manuscripts

Waseem Asif: Conceived the study designed, carried out the data collection and statistical analysis and drafted the manuscripts

All authors are equally accountable for research work

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